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Prevalence of Ectoparasites Infestation in Poultry in Haramaya District, Eastern Hararghe Zone; Oromia Region, Ethiopia

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Abstract

The poultry industry has an important position in the provision of animal protein (meat and egg) to man and plays a vital role in the national economy as a source of revenue. Ectoparasites received little attention in almost all the production systems. Thus, the study was conducted in 2014 with the objectives to estimate prevalence and species of chicken ectoparasites, their predilection sites and to assess potential risk factors associated with their infestation. The present study shows that the prevalence of various ectoparasites in both local and exotic chicken that are reared under both extensive and semi intensive management systems, in eastern Hararghe, Haramaya district. The direct stereomicroscopic identification of poultry ectoparasites identified five species of parasites belonging to the orders of Acarina, Arachnida, Sinophthera and Phthinapthera. The overall prevalence of the ectoparasites in freely scavenging chicken in Haramaya district was 55.47%, which may hinder the productivity of the subsector. Hence, awareness creation should be made to producers to put in place better control and preventive measures to gain the expected output from the growing sector.

Keywords: Chicken; Ectoparasites; Haramaya district; Prevalence species

Introduction

The poultry industry has an important position in the provision of animal protein (meat and egg) to man and plays a vital role in the national economy as a source of revenue [1]. Poultry is one of the most intensively reared of the domesticated species and one of the most developed and profitable animal production enterprises [2]. In Ethiopia, the total chicken population in the country is estimated to be 42 million [3] from the total 18 billion of the world's animal population [4]. About 80% of poultry population in Africa and Asia are kept under free-range system [5]. From the total population of chicken in Ethiopia, 99% are raised under the traditional back yard management system [6] with inadequate housing, feeding and health care [7].

Like all other animals, backyard poultry too suffer from a wide range of maladies. In semi-intensive system, poultry is found to be infested with various types of ectoparasites including different species of lice, mites etc. [8]. The ectoparasites do lower the reproductive success of the birds, and during periods of heavy infestation, may weaken them, lower their resistance. In some cases, severely affected birds may die [9].

External parasites of poultry are common in the tropics because of the favorable climatic conditions for their development and poor standards of poultry husbandry. Some of the ectoparasites are of particular importance as vectors of pathogens and host specific [10]. They can inhibit the skin or outgrowths of the skin of the host organism for various periods [11]. Some are bloodsuckers while others burrow in the skin or live on or in the feathers [12]. Ectoparasites, such as ticks, mites and fleas, live on domestic chicken. Mites have long been recognized as a cause of dermatitis and skin damage on all classes of poultry [13].

The low productivity of poultry can be partly attributed to a range of factors such as suboptimal management, lack of supplementary feed; low genetic potential, high morbidity and mortality due to various diseases [14,15]. Ectoparasites received little attention in almost all the production systems. There were no studies conducted on poultry ectoparasites in Haramaya district until this study; where chicken are source of income generation and food. Thus, the study was conducted with the objectives to estimate prevalence and species of chicken ectoparasites, their predilection sites and to assess potential risk factors associated with their infestation.

Materials and Methods

Study area

The study was conducted in Haramaya district, eastern Hararghe zone of Oromia Regional State of Ethiopia. Haramaya is located approximately 527 km east of Addis Ababa, 14 km west of Harar town. The elevation of the area is about 2000 m above sea level and geographically it located 041°59'58" latitude and 09°24'10" longitudes. The district has about 63,723 cattle, 13,612 sheep, 20,350 goats, 15,975 donkeys, 530 camels and 42,035 chickens. The district receives an average annual rainfall approximately 900mm and climatically there are two ecological zones of which 66.5% is midland and 33.5% is lowland [16].

Study design and animals

A cross sectional study was conducted on 384 local and exotic breeds of both sexes of chicken. The sample animals from peasant associations in Haramaya district were selected by systematic random sampling technique. Preliminary survey was done and code was given for each household that have chicken and by using random sampling methods, a chick was selected from each house. Information on the

breed, age and management system was obtained from the owners by checklist meant for its assessment.

Sample size determination

The required sample size for the study was determined by the formula given by Thrusfeild [17] at 50% expected prevalence, 5% desired precision and 95% confidence interval.

$$N = \frac{1.960*P\ exp\ (1\text{-}P\ exp)}{d^2}$$

Where, n=required sample size

P exp=expected prevalence

d=desired precision

Sampling and collection of ectoparasites

The bodies of the chicken, including the head, neck, breast, back, comb and wings were examined by using naked eyes and hand lens. Any suspected parasites or materials were collected by hand picking and non-toothed thumb forceps in the universal bottles containing 70% alcohol in separate vial for each host and the predilection sites of the body and hypothesized risk factors were noted. Collected samples were transported to Parasitology laboratory in College of Veterinary Medicine, Haramaya University, Haramaya, Ethiopia. The collected parasites were further examined by stereomicroscope and identified according to guidelines described by Soulsby [9]. Shank scraps were collected on clean petri-dish. Wet films were prepared from the scrap and 10% potassium hydroxide was used to emulsify debris and examined under stereomicroscope.

Data analysis

The collected data were coded and entered in to Epi-info and analyzed using Statistical Packages for Social Sciences (SPSS) version 16.0. Frequency was used to calculate the prevalence. Chi-square was used to test the statistical significance difference between the risk factors in prevalence of ectoparasites infestation. P-value less than 0.05 ($p<0.05$) was considered as statistically significance difference among different parameters.

Results and Discussion

Overall prevalence of ectoparasites in poultry

Of the 384 chicken examined, 252 (65.63%) were females while 132 (34.37%) were males. The overall prevalence of ectoparasites infestations was recorded as 55.47%. This is lower than report of 67.95% reported by [18]. However, higher prevalence rate of 91.5% [7], 86.67% [15] and 100% [5] were recorded in East Shoa zone (Ethiopia), Bangladesh and Nigeria, respectively. Five species of ectoparasites were recovered from both management system (i.e extensive and semi-intensive rearing system). *Echidnophaga gallinacean* (*E. gallinacean*) (order: Sinophtera or flea), *Knemidocoptes mutans* (*K. mutans*) (order: Arachnida), *Dermanyssus gallinae* (*D. gallinae*) (order: Acarina) and two species of Phthinaptera or lice order including *Cuclotogaster heterographa* (*C. heterographa*) (head lice) and *Menopon gallinae* (*M. gallinae*) (bodylice) were identified. Lice infestation (27.10%) was the most prevalent species followed by *D. gallinae* (15.10%) and *E. gallinacean* (11.50%) while *K. mutans* (2.20%) was the least prevalent (Table 1).

Orders	Species	Predilection site	No. positive and prevalence (%)
Acarina	*Dermanyssus gallinae*	Rapidly moving through out the body some stacked in the skin ulcer	58 (15.10)
Arachnida	*Knemidocoptes mutans*	Legs	7 (2.2)
Phthiraptera	*Cuclotogaster*	Head, neck	104 (27.1)
	heterographa		
	Menopon gallinae	Thigh, wing, leg	
Sinophthera	*Echidnophaga gallinacean*	Comb, wattle	44 (11.5)

Table 1: Prevalence of ectoparasites of chicken (N=384) with their location.

Mathematically, it seems prevalence of the infestation was higher in male (56.82%) than female (54.8%), young (60.76%) than adult (54.1%), exotic (63.16%) than local (53.57%) breed, Urban (60%) than peri urban (52.4%) chicken. However, there is no statistically significance difference between categories of sex ($p>0.05$), age ($p>0.05$), origin ($p>0.05$), management ($p>0.05$) and breed ($p>0.05$) (Table 2).

Factors	Categories	prevalence	No. of examined	^{2}/Fisher's exact test	p-value
Sex	Female	138 (54.8%)	252	.148	.700
	Male	75 (56.82%)	132		
Age	Young	48 (60.76%)	79	1.127	.288
	Adult	165 (54.1%)	305		
Management	Extensive	199 (56.85%)	350	3.085	.079
	Semi-intensive	14 (41.17%)	34		
Breed	Exotic	48 (63.16%)	76	2.268	.132
	Local	165 (53.57%)	308		
Origin	Urban	93 (60%)	155	2.160	.142
	Per-urban	120 (52.4%)	229		

Table 2: Prevalence of poultry ectoparasites with hypothesized risk factors.

Lice infestation

Of the total 384 chicken examined, 27.10% were found to harbor lice. The fauna of lice infestations of the chicken revealed two major species namely, *Cuclotogaster heterographa* and *Menopon gallinae*. It was higher in female (29.4%), adult (28.2%), exotic breed (40.79%), urban (34.84%) and semi intensive (35.3%) management system than

male (22.72%), young (23%), local breed (23.70%), peri urban (21.83%) and extensive (26.3%) management systems, respectively (Table 3).

Factors	Groups	No. examined	p-value	Orders and their prevalence in %				
				Acarina	Arachnida	Sinophthera	Phthinaptera	
Breed	Local		308	0.050	48 (15.6%)	5 (1.62%)	38 (12.34%)	73 (23.70%)
	Exotic	76	10 (13.16%)		2 (2.63%)	6 (7.89%)	31 (40.79%)	
Origin	Urban		155	0.062	20 (12.90%)	3 (1.94%)	16 (10.32%)	54 (34.84%)
	Peri-urban	229	38 (16.6%)		4 (1.75%)	28 (12.23%)	50 (21.83%)	
Management	Extensive		350	0.019	56 (16%)	7 (2.00%)	44(12.6%)	92 (26.3%)
	Sem intensive	34	2 (5.88%)		0	0	12 (35.3%)	
Sex	Male		132	0.109	20 (15.2%)	2 (1.52%)	23 (17.42%)	30 (22.72%)
	Female	252	18 (7.14%)		5 (1.98%)	21 (8.3%)	74 (29.4%)	
Age	Adult		305	0.236	40 (13.11%)	6 (1.97%)	34 (11.15%)	86 (28.2%)
	Young	79	18 (23%)		1 (1.3%)	10 (13%)	18 (23%)	

Table 3: Prevalence of ectoparasites discovered in Haramaya District.

The observed overall prevalence of lice infestation was higher than that of flea and mites which is comparable to the study in Haramaya University 35.1% [15]). However, it is lower than the one reported by Belihu et al., [7] in Ethiopia (84.3%), Nnadi and George [19] in Nigeria (62.2%) and it was higher than the one reported by Sabuni et al. [20] in Kenya (14.5%) and Abul-Hab, [21] in Iraq (14.2 %). These variations could be attributed to the season, time of the day, and the study location with respect to urban, peri-urban or pure village setting and these environmental factors favor their propagation and life cycle progression of the diverse ectoparasites species.

Flea infestation

An overall 11.5% prevalence of flea infestation was recorded. In this study, the only important species of flea was *Echidnophaga gallinacean*. Its prevalence was higher in local breed (12.34%), peri urban (12.23%), extensive (12.6%), male (17.42%) and young (13%) age groups than exotic (7.89%), urban (10.32%), semi intensive (0%), female (8.3%) and adult (11.15%) age groups respectively (Table 3).

Mite infestation

In this study, two important orders of mites were observed. Order Acarina accounts 15.10% from overall 384 chicken examined for ectoparasites. However, Order Arachnida was the least one in percentage, which is only about 2.2%. The prevalence of the former one is higher in local (15.6%), peri urban (16.6%), extensive (16%), male (15.2%) and young (23.00%) than exotic (13.16%), urban (12.90%), semi intensive (5.88%), female (7.14%) and adult (13.11%) age groups respectively. But the later one is higher in exotic (2.63%), urban (1.94%), extensive (20%), female (1.98%) and adult (1.97%) than local (1.62%), peri urban (1.75%), semi intensive (0%), male (1.52%) and young (1.3%) respectively (Table 3).

The finding was lower than the one reported by Shanta et al., [22] in Bangladesh (57%). Scaly leg mite, *Knemidocoptes mutans* was the least prevalent (2.20%) among the identified ectoparasite infestation. It is a small spherical sarcoptic mite that usually tunnels into the tissue under the scales causing an inflammation with exudates that hardens on the surface and displace the scales resulting in marked keratinization, responsible for the thickened scaly nature of the feet [23]. *K. mutans* was consistently recovered in this study from chicken with scaly legs having a characteristic thickened leg with scaly nature and marked keratinization.

The prevalence of flea infestation observed in this study was less than the report of Belihu et al., [7] in Ethiopia, Swai et al., [24] in Tanzania and Nnadi and George [19] in Nigeria who reported 51.2%, 75.3% and 35.7% respectively. However, the result of this study was higher than the one reported by Sabuni et al., [20] in Kenya (1.5%). This may also attributed to the management practices, environmental situations and owners farming practices. In contrary to this Mekuria and Gezahegn, [25] and Bala et al., [5], found the infestation was higher in females than males. This result is slightly comparable with the finding of Ugochukwu and Omije, [26] who reported multiple ectoparasitic infections from commercial and semi-intensive farms, which had poor sanitation in Nigeria.

Conclusion and Recommendations

Five species of ectoparasites were identified. Sex, age, breed, origin and management systems were considered as important risk factors associated with the prevalence of ectoparasites, but there were no

statistical significant differences among risk factors considered. Large numbers of chicken in the two known production system in the area have ectoparasites of some kind throughout the year with particular parasitic loads during the study period (hot season). This study clearly indicated that the chicken reared under backyard management systems in the district carry medium to high burden of parasitic infections. This is associated with their indiscriminate scavenging behavior. Therefore: 1) Further research to access the impact of these parasites on health and production performance of the scavenging chicken including cost effectiveness of control strategies is suggested. 2) Control and preventive measures with better management system should be provided for keepers of local chicken to boost the poultry production sector. 3) Creation of awareness to producers is also recommended to give due attention to poultry production in the area.

Statement of Ethics

The authors have no ethical conflicts to disclose.

Disclosure Statement

The authors declare no conflicts of interest.

References

1. Food and Agricultural Organization of the United States (FAO) (1998) Village chicken production systems in rural Africa: Household food security and gender issues: FAO animal production and health paper 142, Rome.
2. Obiora FC (1992) A guide to poultry Production in the Tropics. 1st edn. Acena Publishers. pp: 59-61.
3. Central Statistical Authority (CSA) (2009) Agriculture Sample Enumeration Statistical Abstract, Central Statistical Authority, Federal Democratic Republic of Ethiopia.
4. Baboolal V, Suratsingh V, Gyan L, Brown G (2012) The prevalence of intestinal helminths in broiler chicken in Trinidad. Veterinarski Arhiv 82: 591-597.
5. Bala AY, Anka SA, Waziri A, Shehu H (2011) Preliminary Survey of Ectoparasites Infesting Chicken (Gallus domesticus) in Four Areas of Sokoto Metropolis. Nigerian J Basic Appl Sci 19: 173-180.
6. Tadelle D (2003) Phenotypic and genetic characterization of chicken ecotypes in Ethiopia. PhD thesis. Humboldt University, Germany, pp: 208.
7. Belihu K, Mamo A, Lobago F, Ayana D (2010) Prevalence of Ectoparasites in Backyard Local Chicken in Three Agroecologic Zones of East Shoa in Ethiopia. Revue Méd Vét 160: 537-541.
8. Rahman MH, Mondal MMH, Huq MM (1989) A note on the occurrences of parasitic mites of domestic fowls in Bangladesh. Bangla Veterin 6: 45-47.
9. Soulsby EJL (1982) Helminths, Arthropods and protozoa of Domesticated Animals. 7th edn., Baillière Tindall, London.
10. Hopla CE, Durden LA, Keirans JE (1994) Ectoparasites and classification. Rev Sci Tech 13: 985-1017.
11. Durden LA, McLean RG, Oliver JH Jr, Ubico SR, James AM, et al. (1997) Ticks, Lyme disease spirochetes, trypanosomes, and antibody to encephalitis viruses in wild birds from coastal Georgia and South Carolina. J Parasitol 83: 1178-1182.
12. Bishop FC (1942) Poultry Lice and Their Control, USDA, Washington, DC, USA.
13. Hobbenaghi R, Tavassoli M, Alimehr M, Shokrpoor S, Ghorbanzadeghan M, et al. (2012) Histopathological study of the mite biting (Dermanyssus gallinae) in poultry skin. Vet Res Forum 3: 205–208.
14. Kock AH, Halima FWC, Neser E, Marle-Koster N (2007) Village-based indigenous chicken production system in north-west Ethiopia. Trop Anim Health Prod 39: 189-197
15. Amede Y, Tilahun K, Bekele M (2011) Prevalence of Ectoparasites in Haramaya University Intensive Poultry Farm. Global Veterinaria 7: 264-269.
16. Shimelis A (2010) Prevalence of Abomasal Nematode in small ruminants slaughtered at Haramaya Municipal Abattoir, Eastern Hararghe, Ethiopia.
17. Thrufield M (1995) Veterinary Epidemiology 2nd edition Blackwell Wissenschafts verl Berlin Germany.
18. Tamiru F, Dagmawit A, Askale G, Solomon S, Morka D, et al. (2014) Prevalence of Ectoparasite Infestation in Chicken in and Around Ambo Town, Ethiopia. J Veter Sci Technol 5: 1-5.
19. Nnadi PA, George SO (2010) A Cross Sectional Survey on Parasites of Chicken in Selected Villages in the Subhumid Zones of South-Eastern Nigeria. J Parasitology Research 2010: 1-6.
20. Sabuni ZA, Mbuthia PG, Maingi N, Nyaga PN, Njagi LW, et al. (2010) Prevalence of ectoparasites infestation in indigenous free-ranging village chicken in different agro-ecological zones in Kenya. Livestock Res Ectoparasi Rural Dev 22: 11.
21. Abul-hab J (1958) Biting lice of chicken and pigeons in Baghdad area Sc Res Found. Bull Biol Res Cen Iraq 36: 51-56.
22. Shanta IS, Begum N, Anisuzzaman, Bari ASM, Karim MJ, et al. (2006) Prevalence and Clinico-Pathological Effects of Ectoparasites in Backyard Poultry. Bangl J Vet Med 4: 19-26.
23. Urquart GM, Armour J, Duncea JL, Dunn AM, Jennigns FW, et al. (1987) Veterinary Parasitology. Churchill Living stone Inc, New York, pp: 8–170.
24. Swai ES, Kessy M, Sanka P, Bwanga S, Kaaya JE, et al. (2010) A survey on ectoparasites and heamoparasites of free-range indigenous chicken of Northern Tanzania. Livestock Res Rural Dev 22: 9.
25. Mekuria S, Gezahegn E (2010) Prevalence of External parasite of poultry in intensive and backyard chicken farm at Wolayta Soddo town Southern Ethiopia. Vet World 3: 533-538.
26. Ugochukwu EL, Omije FA (1986) Ectoparasitic fauna of poultry in Nsukka Nigeria. Int J Zoonoses 13: 93-97.